

## REMARKS

Claims 1-12 were presented for examination and were pending in this application. In an Official Action dated May 4, 2007, claims 1-12 were rejected.

Claims 1, 9, 7, and 11 are amended herein merely to more clearly define inherent features of the claimed inventions, and claim 12 is canceled herein without prejudice or disclaimer. In view of the amendment and the following Remarks, Applicants respectfully request that the Examiner reconsider all outstanding rejections, and withdraw them.

### Rejections Under 35 USC §103(a)

#### A. Claim 1

In paragraph 1.2 of the Office Action, claim 1 was rejected as being obvious over US Patent No. 6,097,487 to Kringlebotn (“Kringlebotn ‘487”) in view of “Interrogation of Fiber Grating Sensor Arrays with a Wavelength-Swept Fiber Laser” by Yun et al. (“Yun”). This rejection is traversed.

Independent claim 1 recites:

“... a laser wavelength control feedback unit ... for receiving data of the wavelengths in each time period of the wavelength tunable filter from the signal processing unit and for applying DC voltage to the wavelength tunable filter in order that the wavelengths in each time period of the wavelength tunable filter are regularly repeated, wherein the DC voltage is applied in order to constantly maintain time when the absolute reference wavelength is located.

The invention of claim 1 applies a DC voltage to the wavelength tunable filter in order to have the wavelengths in each time period of the wavelength tunable filter be

regularly repeated and constantly maintain the time when the absolute reference wavelength is located. This prevents the wavelengths of the laser from being affected by surrounding conditions.

As the Examiner correctly admits on page 3 of the Office Action, Kringlebotn '487 does not disclose or even suggest applying a DC voltage to a wavelength tunable filter in order to have the wavelengths in each time period of the wavelength tunable filter be regularly repeated and constantly maintain the time when the absolute reference wavelength is located.

Yun also fails to disclose or even suggest applying a DC voltage to a wavelength tunable filter in order to have the wavelengths in each time period of the wavelength tunable filter be regularly repeated and constantly maintain the time when the absolute reference wavelength is located. The Examiner points to pages 843-844 and Fig.1 of Yun for the alleged disclosure of this limitation, however Yun nowhere even mentions applying a DC voltage to a wavelength tunable filter. In the event the Examiner continues the rejection based on Yun, the Examiner is respectfully requested to identify where Yun discloses applying a DC voltage to a wavelength tunable filter in order to have the wavelengths in each time period of the wavelength tunable filter be regularly repeated and constantly maintain the time when the absolute reference wavelength is located.

Applicants have already identified Kringlebotn '487 and Yun in the Background Art section of the specification and their associated problems of the measured wavelength being changed by surrounding conditions and thereby inducing errors in the measured wavelength. See page 3, lines 29-33 of the specification regarding Kringlebotn '487 ("[I]f the wavelength of the reference fiber grating 15 varies in temperature etc., the described method is to have an

error in measuring the wavelength.”). See also page 2, lines 18-20 of the specification regarding Yun (“ [t]here is a problem of deteriorating accuracy and repeatability in long-term measurement due to wavelength drift of the filter caused by hysteresis or temperature change.”). The invention of claim 1 solves the conventional problem (measured wavelength is not stable and is changed by surrounding conditions) of Kringlebotn ‘487 and Yun by applying a DC voltage to a wavelength tunable filter in order to have the wavelengths in each time period of the wavelength tunable filter be regularly repeated and constantly maintain the time when the absolute reference wavelength is located.

To establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. See MPEP §2143.03. The deficient disclosures of Kringlebotn ‘487 and Yun preclude establishing even a *prima facie* basis from which a proper determination of obviousness of claim 1 can be made. Therefore, it is respectfully submitted that the invention of claim 1 is patentably distinct from Kringlebotn ‘487 and Yun.

B. Claims 2-8 and 12<sup>1</sup>

In paragraph 1.3 of the Office Action, claims 2-8 and 12 were rejected as being obvious over US Patent No. 6,097,487 to Kringlebotn (“Kringlebotn ‘487”) in view of “Interrogation of Fiber Grating Sensor Arrays with a Wavelength-Swept Fiber Laser” by Yun et al. (“Yun”). This rejection is traversed.

Claims 2-8 are dependent from independent claim 1 directly or indirectly, and thus all arguments made above regarding claim 1 with regard to Kringlebotn ‘487 and Yun are

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<sup>1</sup> Paragraph 1.3 starts by indicating that claims 2-12 are rejected. However, in the body of paragraph 1.3, only claims 2-8 and 12 are discussed and rejected and claims 9-11 are not discussed or rejected. Rather, claims 9-11 are rejected in paragraph 1.4 of the Office Action. Thus, Applicants’ understanding is that claims 9-11 were included in the first sentence of paragraph 1.3 by error and that it was the Examiner’s intention to reject claims 9-11 in paragraph 1.4 on separate grounds. Thus, Applicants respond to the rejection of only claims 2-8 and 12 in this section B.

equally applicable to claims 2-8 and incorporated herein. As explained above, Kringlebotn '487 and Yun both fail to disclose or even suggest applying a **DC voltage** to a wavelength tunable filter in order to have the wavelengths in each time period of the wavelength tunable filter be regularly repeated and constantly maintain the time when the absolute reference wavelength is located, as recited in claim 1 from which claims 2-8 are dependent.

To establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. See MPEP §2143.03. The deficient disclosures of Kringlebotn '487 and Yun preclude establishing even a *prima facie* basis from which a proper determination of obviousness of claims 2-8 can be made. Therefore, it is respectfully submitted that the invention of claims 2-8 are patentably distinct from Kringlebotn '487 and Yun.

Claim 12 is canceled herein, and thus the rejection of claim 12 is moot.

#### C. Claims 9-11

In paragraph 1.4 of the Office Action, claims 9-11 were rejected as being obvious over US Patent No. 6,097,487 to Kringlebotn ("Kringlebotn '487") in view of "Interrogation of Fiber Grating Sensor Arrays with a Wavelength-Swept Fiber Laser" by Yun et al. ("Yun") and in further view of U.S. Patent No. 6,788,418 to Kringlebotn ("Kringlebotn '418") and in further view of US Patent Application Publication No. 2006/0126067 to Sirat ("Sirat"). This rejection is traversed.

Claims 9-11 are dependent from independent claim 1 directly or indirectly, and thus all arguments made above regarding claim 1 with regard to Kringlebotn '487 and Yun are equally applicable to claims 9-11 and incorporated herein. As explained above, Kringlebotn

'487 and Yun both fail to disclose or even suggest applying a **DC voltage** to a wavelength tunable filter in order to have the wavelengths in each time period of the wavelength tunable filter be regularly repeated and constantly maintain the time when the absolute reference wavelength is located, as recited in claim 1 from which claims 9-11 depend.

Kringlebotn '418 also fails to disclose or even suggest applying a **DC voltage** to a wavelength tunable filter in order to have the wavelengths in each time period of the wavelength tunable filter be regularly repeated and constantly maintain the time when the absolute reference wavelength is located, as recited in claim 1 from which claims 9-11 are dependent. Kringlebotn '418 was merely relied upon in the Office Action for the alleged disclosure of a polarizer placed at the output of the tunable FP etalon, but has nothing to do with applying a DC voltage to a wavelength tunable filter.

Likewise, Sirat also fails to disclose or even suggest applying a **DC voltage** to a wavelength tunable filter in order to have the wavelengths in each time period of the wavelength tunable filter be regularly repeated and constantly maintain the time when the absolute reference wavelength is located, as recited in claim 1 from which claims 9-11 are dependent. Sirat was merely relied upon in the Office Action for the alleged disclosure of a depolarizer placed before a polarizer, but has nothing to do with applying a DC voltage to a wavelength tunable filter.

Therefore, claims 9-11 are patentably distinct from "Kringlebotn '487, Yun, Kringlebotn '418, and Sirat, for at least this reason.

In addition, claim 9 additionally recites that "a depolarizer is further installed at an output end of the wavelength tunable laser, and the first coupler splits the light depolarized by the depolarizer into two directions." Also, claim 11 additionally recites that "the

wavelength tunable laser further comprises a polarization scrambler at output end thereof, and the first coupler splits the light depolarized by the polarization scrambler into two directions.” Thus, the inventions of claims 9 and 11 include a depolarizer or polarization scrambler for depolarizing the output light of the laser and splitting the depolarized light into two directions for use in for controlling the wavelengths of the laser.

As the Examiner admits in the Office Action, Kringlebotn ‘487, Yun, and Kringlebotn ‘418 all fail to disclose a depolarizer that is installed at an output end of the wavelength tunable laser, and that the first coupler splits the light depolarized by the depolarizer into two directions. Kringlebotn ‘487, Yun, and Kringlebotn ‘418 do not disclose using depolarized light (depolarized by a depolarizer as in claim 9 or a polarization scrambler as in claim 11) to control the wavelengths of a wavelength tunable laser. Note that Kringlebotn ‘418 merely discloses a polarizer, but not a depolarizer, which the Examiner appears to admit.

Sirat also fails to disclose a depolarizer or polarization scrambler that is installed at an output end of the wavelength tunable laser, where the first coupler splits the light depolarized by the depolarizer or polarization scrambler into two directions, as recited in claim 9 or 11. Although Sirat mentions a depolarizer, this depolarizer is merely used for depolarizing the light of laser before polarizing. That is, Sirat depolarizes a light with the depolarizer before polarizing the depolarized light with a polarizer, simply so as to use the polarized light. See Sirat, paragraph [0198] (“ [A]pparatus 10 preferably comprises a depolarizer 25 ... positioned before polarizer 23 for depolarizing the light prior to the polarization performed by the polarizer 23.”) In Sirat, because the light depolarized by the depolarizer 25 is immediately polarized by the polarizer 23 (see Sirat, Fig. 3), the depolarized

light cannot be split into two directions. Thus, Sirat fails to disclose that a coupler splits the light depolarized by the depolarizer or polarization scrambler into two directions, as recited in claim 9 or 11, respectively.

Therefore, claim 9, claim 10 (which is dependent from claim 9), and claim 11 are patentably distinct from Kringlebotn '487, Yun, Kringlebotn '418, and Sirat, for at least this additional reason.

To establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. See MPEP §2143.03. The deficient disclosures of Kringlebotn '487, Yun, Kringlebotn '418, and Sirat preclude establishing even a *prima facie* basis from which a proper determination of obviousness of claims 9-11 can be made. Therefore, it is respectfully submitted that the invention of claims 9-11 are patentably distinct from Kringlebotn '487, Yun, Kringlebotn '418, and Sirat.

#### Conclusion

In summary, it is respectfully submitted that all pending claims 1-11 are in condition for allowance. Favorable action is solicited.

Respectfully submitted,  
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